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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/723,084	11/26/2003	Srinivasa Narasimhan	0019240-00202 (A-00062)	6556

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EXAMINER	
BROOME, SAID A	

ART UNIT	PAPER NUMBER
2671	

DATE MAILED: 11/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/723,084	NARASIMHAN ET AL.	
	Examiner	Art Unit	
	Said Broome	2671	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 November 2002*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-65* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-65* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-8, 10-24, 26, 29-36, 38-52, 54, and 57-65 are rejected under 35 U.S.C. 103(a) as being unpatentable over Evans (The Spherical Harmonics Discrete Ordinate Method for Three-Dimensional Atmospheric Radiative Transfer) in view of George (US Patent 6,459,818).

Evans teaches the limitations of claims 1, 18, 29, 46, 57, 60 and 63 except for capturing the image of the light source and identifying that light source. Evans teaches a method and system for indicating a property of a medium in which a light source is encompassed on page 440 second column 3rd paragraph lines where it is described that the property of a medium is determined and contains a light source that is analyzed under atmospheric interference(p. 440 first column 2nd paragraph lines 7-9), as stated in the preamble of claims 1, 29, 57, 60, and 63. Evans also teaches modeling multiple scattering of light from the light source in the medium using a radiative transfer equation for spherical media on page 430 first column paragraph 2 lines 16-29, where it is described that a successive scattering or multiple scattering, which is the scattering of light from a light source, is modeled(p. 440 first paragraph lines 1-3) using a radiative transfer equation for spherical media. Evans also teaches determining the property of the medium on page 430 second column 1st paragraph lines 10-12 where it is described that the

properties of a cloud is determined. Again, Evans fails to teach capturing the image of the light source and identifying that light source. Regarding the preamble of claims 18 and 46, George teaches in column 3 lines 66-67 and column 4 lines 1-3, an input device comprised in the computer system 20 illustrated in Figure 1A, therefore it would have been obvious to enable the alteration of the image of interest. George also teaches the limitation of claims 1, 18, 29, 46, 57, 60 and 63, in column 2 lines 14-19 where it is described that an image of the light source is acquired or captured. Though George does not explicitly teach identifying the light source in the image, George does teach identifying the image data related to an image containing atmospheric turbulence in column 2 lines 43-45, therefore it would have been obvious to enable the identification of the light source as well. It would have been obvious to one of ordinary skill to combine the teachings of Evans with George because this combination would provide the image acquisition of images containing a light source under atmospheric interference conditions in which the radiance and scattering of the light would be modeled accurately in three dimensions using a radiative transfer equation for spherical media.

Regarding claims 2-6, 19-22, 30-34, 47-50, 58, 59, 61, 62, 64, and 65, Evans teaches modeling the scattering of light from a light source in an atmospheric medium that would be found in nature on page 440 second column paragraph 4 lines 39-58. Therefore, it would have been obvious to one of ordinary skill in the art to make the medium of interest any medium found in atmospheric weather conditions, or a medical medium, both commonly found in nature.

Regarding claims 7, 23, 35 and 51, Evans teaches that the Legendre polynomial is used to scatter light in the radiative transfer equation model for spherical media on page 430 column 2 paragraph 2 lines 18-25.

Regarding claims 8, 24, 36 and 52, though Evans does not explicitly teach an axially symmetric phase function, it would have been obvious to one of ordinary skill in the art to substitute any phase function to model the multiple scattering of the light because it is known that phase functions describe the scattered radiance depending on a scattering angle, which would be utilized by radiative transfer equations for spherical media to model the multiple scattering of light.

Regarding claims 10, 26, 38, and 54, Evans teaches multiple scattering of light without using a Monte-Carlo technique on page 429 column 2 second paragraph lines 6-9 where it is described that alternative methods, to Mont-Carlo technique, such as the radiative transfer function for spherical media, are used to represent the radiance field and multiple scattering of light as described on page 430 first column second paragraph lines 16-29.

Regarding claims 11, 14, 15, 39, 42, 43, 57, 60 and 63, though Evans does not explicitly teach determining the forward scattering parameter, the optical thickness, and the visibility of the area, it would have been obvious to one of ordinary skill in the art to determine those parameters in order to more accurately define the characteristics of the light source as much as possible to determine the visibility of light scattering from the light source through using these parameters in the radiative transfer equation.

Regarding claims 12 and 40, Evans teaches all the limitations except for determining the relative size of particles surrounding the light source. Though George does not explicitly teach the determination of the relative size of particles surrounding the light source, it is illustrated in Figure 4A that the points surrounding the light source through atmospheric turbulence is represented graphically. Therefore it would have been obvious to one of ordinary skill in the art

to combine the teachings of Evans with George because this combination would provide the obtained relative size of the particles for analysis from the coordinates and parameters that define the data presented on the graph.

Regarding claims 13 and 41, Evans teaches all the limitations except for determining the range from the light source to the image acquisition device. George teaches determining the range in column 6 lines 24-27, where it is described that the horizontal distance path, or the distance from the light source to the image acquisition device, is determined as illustrated in Figure 1A as element S1. It would have been obvious to one of ordinary skill in the art to combine the teachings of Evans with George because this combination would provide an accurate measurement of the distance from the light source to the image acquisition device, which would be directly available for modification or adjustment thereby improving the acquisition of the images and the accuracy of the results.

Regarding claims 16 and 44, Evans teaches determining whether enough coefficient terms are being used on page 440 first column 2nd paragraph lines 16-20, where it is described that only the required number of coefficients are used for the spherical harmonic representative of the radiative transfer function, therefore enough coefficients are determined for the spherical harmonic equation.

Regarding claims 17 and 45, though Evans does not explicitly teach averaging different values of detected intensity of a glow of the light source along radial contours of the image, Evans does describe determining the radiative properties of the image under atmospheric inhomogeneities. Therefore it would have been obvious to one of ordinary skill in the art to

provide the intensity of a glow in a radial contour, as illustrated in Figure 3, which would then be available for averaging as well.

Regarding claim 60, George teaches locating a first and second image from an imager device in column 2 lines 14-30. Therefore it would have been obvious to use two image acquisition devices because it would reduce the time used to acquire the images.

Claims 9, 25, 37, and 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Evans (The Spherical Harmonics Discrete Ordinate Method for Three-Dimensional Atmospheric Radiative Transfer) in view of George (US Patent 6,459,818) in further view of Anderson et al. (US Patent 5,884,226).

Evans and George teach all the limitations of claims 9, 25, 37, and 53 except for the multiple scattering of light using an axially symmetric phase function and a Henyey-Greenstein phase function. Anderson et al. teaches a multiple scattering using the Henyey-Greenstein phase function in column 7 lines 43-54. It would have been obvious to one of ordinary skill in the art to combine the teachings of both Evans and George and combine it with Anderson et al. because this combination would provide a phase function that would efficiently model the multiple scattering of light.

Claims 27, 28, 55 and 56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Evans (The Spherical Harmonics Discrete Ordinate Method for Three-Dimensional Atmospheric Radiative Transfer) in view of George (US Patent 6,459,818), in further view of Mengüçet et al. (US Patent 6,721,051).

Evans and George teach all the limitations of claims except for removing and adding a multiple scattering effect to the image. Mengüçet et al. describes removing multiple scattering effects from the image in column 5 lines 19-26. Though Mengüçet et al. does not explicitly teach adding a multiple scattering effect to the image, it would have been obvious to enable the addition of multiple scattering effects by simply adding the removed portion. It would have been obvious to one of ordinary skill in the art to combine the teaching of Evans and George and combine them with Mengüçet et al. because the combination would provide the capability to alter the image by adding and removing multiple scattering effects, which would enable the adjustment of light and scattering effects to improve the quality and visibility of image during analysis.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Said Broome whose telephone number is (571)272-2931. The examiner can normally be reached Monday-Friday between 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ulka Chauhan can be reached on (571)272-7782. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

S. Broome SB
11/3/2005

RICHARD HJERPE 11/8/05
SUPERVISORY PATENT EXAMINER
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